PROCEEDINGS

OF THE

EDINBURGH PHYSIOLOGICAL SOCIETY.

WINTER AND SUMMER SESSION—1852-53.

EDINBURGH:
PRINTED FOR THE PHYSIOLOGICAL SOCIETY,
BY MURRAY AND GIBB.

MDCCCLIII.

PHYSIOLOGICAL SOCIETY OF EDINBURGH.

SESSION III. (*Winter* 1852-53.)—MEETING I.—27*th November* 1852.

Professor BENNETT, President, in the Chair.

The President observed that the objects of the Society remained the same as he had recapitulated on former occasions; and that there could be little doubt, from what he knew of the exertions of individual Members during the autumn, that the present Session would equal, if not surpass, former ones in interest. He alluded to similar institutions existing in France and Germany, and believed that, before long, societies established to promote limited branches of natural science, would find it necessary to combine, in order even that their own special subjects should be advanced. In the meantime, he again invited all those who were earnestly engaged in prosecuting a knowledge of the structure, development, and functions of living beings in their healthy and diseased conditions, to join the Society, and further the important objects it was established to promote.

EFFECTS OF PUS ON THE BLOOD.

1. *Dr Bennett,* after some observations on the effects of adding pus to the blood, alluded to some experiments of Dr Henry Lee of London, who had injected pus into the veins of an ass, and found it to produce coagulation of their contents. He (Dr B.) had repeated this experiment in a cat, with the assistance of Dr James Drummond, but no such coagulation had taken place. Two drachms of healthy pus were, in this experiment, injected into the crural vein, and the animal, after two days of repose, was as lively as before. He announced that, through the kindness of Mr Barlow, an ass had been procured, in order that Mr Lee's experiment might be again carefully performed; and he proposed that a committee of the Society should be appointed to investigate this subject.

This was agreed to; and the following gentlemen were appointed to report on some future occasion:—Drs Bennett, Gairdner, Cobbold, Sanders, and Mr Barlow.

MINUTE CYST-FORMATION IN THE KIDNEY, WITH GRANULAR DEGENERATION OF THE CYSTIC EPITHELIUM, AND SOME GRANULAR MATTER IN THE TUBULI URINIFERI.

2. *Dr W. T. Gairdner* showed the right kidney of a man affected with tubercular disease of the lungs and intestines. Both kidneys presented considerable atrophy of the cortical substance, connected with (or possibly dependent upon)

the microscopic cyst-formation first described by Mr Simon, of St Thomas' Hospital; they were likewise, however, affected with incipient opaque granulations of Bright, not easily visible by the naked eye, but revealed distinctly by the microscope. The following is the description in the Pathological Register of the Royal Infirmary (XV-26):—

"Kidneys unusually small (dimensions of right kidney $3\frac{1}{2}$—$1\frac{3}{4}$—$\frac{3}{4}$ inches; left kidney nearly the same size); capsule easily stripped; surface slightly uneven, not distinctly tuberculated; venous vascularity of surface considerable, but irregular; on section, cortical substance much diminished in breadth (average $\frac{3}{8}$th inch diameter from bases of pyramids); limit-line of pyramids tolerably distinct, a faint appearance of opaque granulations appreciable by the naked eye. On examination with a simple lens, very many minute cysts discovered in the cortical substance, mostly requiring a power of $\frac{1}{2}$ inch focal distance to bring them into view. A similar power, or even the naked eye, distinguishes easily a number of opaque light gamboge-yellow points in the cortical substance, the largest about $\frac{1}{50}$th of an inch diameter, accurately limited, and yielding, on being punctured, a fluid of similar colour (A). In the cortical substance there are also some minute hemorrhagic petechiæ, having the usual appearance of extraversation in the tubuli.

"With high powers, the tubuli uriniferi seem to be in part of absolutely normal characters, with the exception of a very few granules in the epithelium; in some of the tubes, on the contrary, there are very many granules (fatty). Epithelium of tubes generally normal where the granules are not in excess. In many places, the loculi of the kidney are filled with distinct cystic structures, consisting of a delicate membrane, quite distended and spherical. The contents of the cysts are, in some cases, not to be seen; in other instances, there are indications of an epithelium very different from that of the renal tubuli, being much more transparent and delicate, generally about a third smaller, and the nuclei in proportion smaller. Some of the cysts, which are about the size of the Malpighian bodies, or rather less, show a distinct nucleus about twice the size of a renal glandular cell.

"In fluid (A) were found, under high powers, an immense number of fatty granules, partly loose, partly agglomerated into amorphous collections, partly composing distinct rounded granular cells, up to $\frac{1}{90}$th of a line in diameter, and partly infiltrated into cells of a very fine delicate transparent character, presenting much of the appearance of a tesselated epithelium, and strongly resembling those above described as lining the interior of the cysts.

"In addition to the above morbid appearances, two or three minute miliary tubercles, of the ordinary appearance in all respects, were found in either kidney."

A section of the kidney, by the double-knife, was submitted to the Society, under a power of 240 diameters, as also a portion of the fluid (A), exhibiting the structures above described.

In reference to these preparations, Dr Gairdner made the following remarks:—

I am glad to have an opportunity of submitting to the Physiological Society these demonstrations of minute cyst-formation in the kidney, a morbid appearance by no means uncommon, and one which I have observed in numerous instances since it was brought into notice by Mr John Simon. The correctness of Mr Simon's observations has been called in question; and it has even been asserted, in a work of high authority,[1] that he has fallen into the error of mistaking the normal distribution of the tubuli, as seen in the meshes of the so-called fibrous matrix of the kidney, for a cystic structure. I trust I have been able here to demonstrate to the Society what Mr Simon actually saw, and what he has described and represented in his memoir in the Medico-Chirurgical Transactions, vol. 30. It will be seen that the cysts are perfectly spherical, having altogether the refraction and the characters of a closed membrane distended with fluid, and that their epithelium, owing to its delicacy, and the globular character of the cysts, is with difficulty seen; while on the other hand, the renal tubuli vary in form, have not the distended appearance, and have a very distinctly visible epithelial lining. I do not believe that any one coming to the study of renal pathology with an accurate knowledge of the histological characters of minute cysts, was in the least danger of making the mistake attributed to Mr Simon, whose descriptions show that he perfectly appreciated the difference between the normal structures of the kidney and the cysts described by him. The resemblance between the pathological structures now before the Society and the normal cysts of the thyroid gland, is very striking; and Mr Simon's well-known investigations on the structure of the glands without ducts, placed him in a favourable position at once to appreciate this resemblance, and to distinguish between the appearance of a closed vesicle and an open tube.

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[1] Cyclopedia of Anatomy and Physiology. (Art. Ren.)

By the use of simple lenses, and of low powers of the compound microscope, these cysts can be easily traced down from a size visible by the unaided eye to very small dimensions. Their character remains quite distinct, as remarked by Mr Simon, even when they are not larger than an epithelium-cell, from which they differ by their almost absolutely spherical form, and comparatively high refractive power. They are generally to be found in considerable numbers on the surface of the kidney, and in this situation are easily detected, even when very small, by the naked eye. In a section of the cortical substance, it is often difficult to distinguish these small cysts from the Malpighian bodies, except by examining their sections with the aid of transmitted light and moderately high microscopic powers. The smaller cysts are, therefore, much more easily identified than those of intermediate size, which are apt to be destroyed in making the sections; and this circumstance prevented me, for some time, from being able to assure myself of the transition of the microscopic cysts into those long familiar to pathologists. In writing on the pathological anatomy of the kidney in 1848, I noticed and figured the occurrence of small cysts, which I had observed even before the publication of Mr Simon's memoir, but which I had not been able, for the reason to which I have referred, positively to identify with those described by him. Subsequent observations have filled up the link which was then wanting, and I have now been long familiar with all the appearances presented by these bodies.

The substantial accuracy of Mr Simon's descriptions has been admitted, and his views on cyst-formation in the kidney have been adopted without reservation, by Rokitansky and others. I think it important, therefore, to take this opportunity of stating some points in which my observations differ from those of Mr Simon, and prevent me from concurring in his views of the nature and origin of these cysts, and of their connection with other forms of renal disease.

1. According to Mr Simon, the formation of epithelium in the interior of the cysts is an accidental phenomenon, not found in the larger varieties, and only occasionally present at certain stages of their growth. I have, on the contrary, never found an epithelial lining absent in the larger cysts; and at the different stages of their existence, its characters undergo so little modification, that I cannot but believe it to be an essential element in the development of these structures. In many cases, especially in the smaller cysts, it is difficult to bring it into view, from the spherical refraction of the surrounding cyst-wall, and the delicacy of the epithelium cells; but the absence of epithelium cannot be assumed in these cases, as careful management of the light and of the focus will often detect it where it would otherwise escape attention.

2. The connection of the cyst-formation with primary disorganisation of the tubes and desquamation of the epithelium, or, in other words, with Bright's disease of the kidney, is by no means so constant as is indicated by Mr Simon; nor, indeed, is it, according to my experience, at all more frequent than might be expected from the accidental concurrence of two very common affections. I believe,

indeed, that there is a peculiar form of renal atrophy which results from the formation and secondary collapse of these cysts, as there is a well-marked form of enlargement of the kidney which is due to their progressive growth; but both the one and the other is manifestly a distinct affection from the desquamative disease of the renal epithelium, regarded by Mr Simon as the necessary cause of cyst-formation. So much is this the case, that nothing is more common than to meet with kidneys extensively occupied by cysts, in which all the intervening cortical substance presents strictly normal characters, both to the naked eye and the microscope; and, on the other hand, I am fully satisfied that desquamative disease of the kidneys may run through all its stages without a trace of cyst-formation. My observations are, accordingly, completely at variance with much of the reasoning in Mr Simon's paper, and especially with these two propositions, which lie at the root of the whole question of the connection of subacute inflammation of the kidney and cystic disease. "The cyst-formation does not occur idiopathically, but only in connection with diseases which are themselves fully adequate to account for the blocking and bursting of the tubes."[1] "I am inclined to view this process (cyst-formation) as *inseparable* from any such acute inflammation of the gland as may terminate in its contraction."[2]

3. Differing from Mr Simon as to these propositions, I am still less disposed to agree with him in his further generalisation, that the "mottled" and the contracted kidney belong to "different morbid actions, and not to different stages of the same." I have, indeed, been quite unable to identify any form of large or mottled kidney exclusively with fatty degeneration, or to determine the dependence of either upon the scrofulous diathesis. Nor has the contracted and atrophied kidney appeared to me (whether originating in cystic disease or not) to have any such special and exclusive affinity with the "irritative blood-diseases," as is assigned to it both by Mr Simon and by Dr Johnson. I could adduce instances which are in glaring opposition to both these theories, as well as to other recent hypothetical views on renal disease. To go no farther than the case now before the Society, it illustrates, *firstly*, the combination of the cystic with the fatty degeneration, which, according to Mr Simon, belong, in almost every instance, to different morbid actions; *secondly*, the existence of the cystic disease without evidence of epithelial engorgement, which is considered by Mr Simon essential to its production; *thirdly*, the coincidence of the two hypothetically different and opposed forms of renal degeneration, with pure phthisis, which is presumed to be a cause of the fatty degeneration alone. It would be beyond the scope of my present intention to follow out this very wide subject; but this case is only one of many which occur to me as illustrating these positions.

To sum up these remarks, I would state as my very strong impression, derived from the examination of many cases of cystic disease of the kidney, that while it may, as in the present case, be accidentally combined with one or other collateral form of anatomical lesion, it may likewise occur quite uncombined, the cysts springing up and running their course in greater or less numbers in an organ otherwise healthy. The occurrence of tubular engorgement or epithelial extravasation, is therefore in no way essential to their origin. Mr Simon attaches great importance to this last condition; but the bursting of the tubuli uriniferi and the displacement of their cells into the surrounding interspaces, is a condition which I have never been able to verify by observation, and of which it would be not a little difficult, in my opinion, to obtain satisfactory proof.

These observations and deductions seem to throw great doubt on the theory suggested by Mr Simon as to the origin of the renal cysts from normal epithelium. That the development of these structures is extra-tubular, is admitted by Mr Simon; and though here, too, doubts might be raised, yet this remark seems on the whole consistent with observation. The extravasation of the epithelium-cell, therefore, is a necessary portion of this hypothesis of their origin, which derives no support from direct observation, except what arises from the similarity in size and form between the incipient cysts and epithelium-cells. But this similarity is more apparent than real; for I have frequently seen cysts of apparently even smaller size than renal epithelium cells; and when it is considered that the cysts are always fully distended, while the renal epithelium-cell is never found in this condition, the cysts in question must have been *in reality* much smaller than epithelium-cells. Whether this is the ultimate limit, it is impossible to say without still more minute examination. But surely the asserted likeness between the cyst-germ and the epithelium-cell is no greater than the similarity found between all nascent cell-structures; while the differences, even at this early period, and still more in their mode of development, are sufficiently striking to suggest a different origin. That these cyst-germs are parasitic, or entirely foreign to the normal structure of the kidney, appears, from the progress of microscopic inquiry, to be rendered very probable; and, at all events, I believe that the attempts to connect them with morbid processes of the tubuli uriniferi and epithelium have been founded on imperfect observation.

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[1] Medico-Chirurgical Transactions. Vol. 30, p. 152.

[2] Ibid, p. 157.

The granular degeneration of the contents of the renal cyst, of which an example is laid before the Society, has not, I believe, been before described, and is interesting as the solution of a form of pathological lesion often recognised by the unaided eye, and not unfrequently mistaken by inexperienced observers for the granulations of Bright in an exaggerated form. As in the present instance, the two lesions may coincide, but this is by no means necessarily the case. I have never yet seen this degeneration (except in one doubtful instance) in cysts of larger size than a sago grain.

ON MORBID ALTERATIONS IN THE MALPIGHIAN BODIES OF THE HUMAN SPLEEN.

3. *Dr Sanders* exhibited and described prepared specimens of the transparent condition of the Malpighian bodies in the human spleen; and remarked on the connection of this state with tubercular and Bright's disease, in the cases observed. The spleens were sometimes softened, but most frequently presented the hard waxy appearance mentioned by Rokitansky, of which a specimen has been described by Dr Handfield Jones in the Reports of the Pathological Society of London for 1852. In a well-marked example of the waxy spleen with transparent Malpighian bodies, a great number of these were found filled with blood recently extravasated, giving the fresh section a peculiar dark-spotted appearance; the effusion was limited to the Malpighian bodies, and preserved their shape; no extravasation occurred elsewhere in the spleen or other organs. The case was one of advanced tubercular phthisis; the liver both waxy and fatty; ulcerations in the ileum; kidneys fatty, with tubercle mostly on their outer surface; and a yellow tubercular deposit the size of a pea in the spleen.

PECULIAR VARIETY OF FIBROUS TUMOURS.

4. *Dr W. T. Gairdner* showed a number of soft elastic tumours from the size of a lentil to that of a bean, which had been found in the cellular tissue of a man who died of phthisis; the tumours had been very numerous, but had apparently caused no symptoms, and were not, indeed, detected till after death. Most of them were subcutaneous, and some had pushed the integuments before them so as to form projecting and almost pendulous bodies. Others were found in the cellular tissue between the abdominal muscles, and one small nervous twig entering the transversalis muscle passed through one of these tumours about three-eighths of an inch in length, the nerve-tubes being expanded and separated from each other by the tumour, which was probably developed in connection with the neurilemma. The tumours had the structure

of an exceedingly fine fibrous tissue, with minute oval nuclei, not more than $\frac{1}{400}$ to $\frac{1}{200}$th of a line in diameter. The section appeared to the naked eye homogeneous and pearly white; it yielded no juice; and it was only by means of a lens that fibres could be detected in it. In this respect, as well as in its soft elastic consistence like that of a well filled down pad on a minute scale, it differed from most of the fibrous tumours commonly described.

MEETING II.—*December* 11, 1852.—Professor BENNETT, P., in the Chair.

1. *Dr Bennett* exhibited accurate copies, from some drawings of M. Bernard, for which he was much indebted to that distinguished physiologist, illustrative of the anatomy and functions of the pancreas in the rabbit and dog, as well as of the vascular connection between the vena cava and vena portæ in the horse. Mr Struthers and Mr Barlow were appointed to examine the connection thus stated to exist between the portal vein and posterior cava in the horse, and to see if any corresponding communications exist in man.

DILATED BRONCHI RESULTING FROM HEALED TUBERCULAR CAVITIES.

2. *Dr Bennett* exhibited the left lung of a young man who had lately died in his clinical ward of chronic phthisis. It was atrophied and contracted, so as not to be larger than the human fist, and was universally adherent to the surrounding organs by dense fibrous tissues uniting the pleuræ. On section, it presented all the characters described as dilatation of the bronchi by Reynaud and Carswell, and of cirrhosis of the lung by Corrigan; but with the exception of two small cretaceous concretions at the apex, it did not present a trace of tubercle. The opposite lung was voluminous and healthy, with the exception of miliary and infiltrated chronic tubercle at the apex, extending over a space the size of a hen's egg. In this case the patient, two years ago, had exhibited all the signs and symptoms of advanced phthisis, with an enormous cavity in the left lung; and since then careful observation had shown the gradual contraction of the cavity and of the lung, which was supposed to be slowly cicatrising. The individual died, however, from scrofulous abscesses in both kidneys, with excessive discharge of pus and suppression of urine. Dr Bennett was of opinion that the appearances now observed in the lung before the Society, were entirely owing to the absorption of the tubercle and gradual closure of the tubercular cavities. He had carefully examined the lining membrane of the apparent bronchial dilatations, and had satisfied himself that they were destitute of epithelium. He therefore regarded them as the remains of former tubercular abscesses, rather than as bronchial dilatations.

3. *Dr W. T. Gairdner* said that he had no doubt, in this instance, that tubercular cavities had formed and healed. The resemblance of the lung to Corrigan's "cirrhosis," or to what has been called "dilated bronchi," was exactly what he would be inclined to expect in such cases; and he had elsewhere stated (in his Papers on Bronchitis, *Monthly Journal* for 1851) the reasons which induced him to consider almost all the alleged cases of dilated bronchi as having their origin, like this one, in healed ulcerative excavations. The present case he considered as a remarkably interesting one in relation to this pathological question, as well as in showing one mode of the healing of tubercular cavities. Dr G. referred to a case delineated by Cruveilhier (*Anat. Path*, vol. ii.) in which a tubercular lung had the entire upper lobe excavated and healed, without the slightest diminution in the size of the cavities, while the lower lobes presented all the intermediate stages between recent excavation and the healed cavern. Cruveilhier's remarks in this case and on the different modes in which tubercles may heal, were very instructive in relation to the present and other similar cases.

NEW FORM OF CANCER-CELL.

4. *Dr Dobie* showed a mamma which had been removed by Mr Syme in consequence of being affected with malignant disease. It was also found to contain a cyst bearing the usual characters of a hæmatocele. A demonstration from the malignant part of the tumour was made under the microscope. Dr Dobie also showed a large biliary calculus passed by an aged female.

Dr Bennett observed, that in the demonstration now made under the microscope, groups of cancer-cells might be seen to be embedded in a molecular matrix. These he did not regard as compound cancer-cells, but as aggregations of cells, more or less adherent together by an extra-cellular blastema, as described in his work on "Cancerous and Cancroid Growths," pp. 41, 42. He had seized on every opportunity of bringing before the Society any new forms of cancerous growth which had fallen under his observation; and he now described one, which he thought had not previously been noticed. It consisted of large cells, the three-hundredth or four-hundredth of an inch in diameter, containing a varying number of round nuclei, about the three-thousandth of an inch in diameter. They closely resembled some of the large cells observed in the mesenteric glands in cases of typhoid fever, but were two or three times the size. He had seen this form of cell-growth in a soft cancerous tumour, shown to him by Dr Gairdner.

5. *Mr Barlow* exhibited under the microscope a section of the thyroid body in the horse, showing very distinctly the closed sacs in that organ, and the arrangement of the vessels around them.

MEETING III.—*December* 18, 1852.—Dr GAIRDNER, Vice-President, in the Chair.

1. *Dr Gairdner* showed some cancer cells, to which he had alluded at last meeting as exhibiting the usual characteristic of these structures.

ON ACTINIÆ.

2. *Dr Cobbold* made a lengthened verbal communication "On the Structure and Functions of Actiniæ." He commenced by stating, that, notwithstanding the ease with which these animals were obtained, and all that had been written about their organisation, reproduction, and mode of development, he believed, from a few recent original observations, that our knowledge of their true structure and functions was still very imperfect. He was convinced—

In the first place, that the stomach was not a simple sac closed at the base, but (as the specimens of *A. gemmacea* on the table showed) there existed at the bottom of that organ a considerable opening communicating with the ovarian chambers.[1]

Secondly. Dr C. had watched and witnessed the progress of evolution of the young of Actinia *from the mouth.* This observation coincided with the statements of Spix, Dalyell, and others, and confirms their opinion that Actiniæ are viviparous; and this fact, together with the circumstance of the opening at the base of the stomach, entirely clears up the mystery as to how the young polyps are set free. He proceeded further to show—

In the third place, The mode in which the young *were developed,* by which it was also demonstrated that the stomachal cavity must not only possess a superior, but also an inferior (or pyloric?), aperture, communicating with the interseptal chambers, and these again through the tentacular (or morphologically true anal) orifices with the surrounding medium. He had noticed, in common with others, that after the digestible matters of any shell-fish had been absorbed into the economy, the shell or indigestible portions of the ingesta were expelled at the oral aperture; but having watched for hours and seen the young Actiniæ expelled by the mouth, he felt certain that some opening must exist in connection with the ovarian chambers, and this was fully borne out by tracing their *mode of development.*

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[1] This opening is not represented in the *figures* given by Drs Sharpey, Quoy, Gaimard, and others. Professors Carpenter and Rymer Jones state that there is no communication; Owen and Grant recognise it; and Mr Goodsir informs me, that he has repeatedly pointed it out in his lectures.

Fourthly. When the young escaped, they invariably sank to the bottom of the vessel, resting on their outspread tentacula, with their *base* or portion corresponding to the sucking-disc uppermost; they then moved this latter part of the body sideways after the manner of Hydræ, and if the mother Actinia or any projecting body lay in the vicinity, they immediately attached themselves to it, and there remained. Some of them, becoming adherent to the adult Actinias, gave the idea of a gemmiferous mode of reproduction, which curious circumstance Dr Cobbold believed to explain fully the notion of reproduction by gemmation hitherto ascribed to the whole group of these animals by so many able and distinguished writers. Their multiplication by fissiparous division was well illustrated by the specimens then before the Society.

Fifthly. Dr Cobbold believed the so-called tubercles which exist in *A. mesembryanthemum* to be functionally *eyes.* In one species in which he had examined them microscopically, he had found them to contain in their interior innumerable small fusiform crystals. The blue colour of these *eyes* (?) was entirely owing to the presence of these mineral bodies, and not to the existence of true pigmentary matters, as some had supposed. The mode in which these crystals are formed, and the fact of their occurring also (in an imperfect state) round the edge of the sucking-disc, was also pointed out. Some remarks in conclusion were made on the histological characters of Actiniæ and of polyps generally, but details on this head were reserved for a future meeting.

Meeting IV.—*January* 8, 1853.—Dr Bennett, President, in the Chair.

REPORT ON THE LOCAL EFFECTS OF PUS ON THE BLOOD.

1. *Dr Bennett* brought forward the report of the committee appointed to repeat Dr Henry Lee's experiments on an ass, with a view of determining the local effects of pus on the blood:—

Experiment 1.—The saphena vein of an ass was exposed, and a tube introduced confined by a ligature. Fresh and healthy pus was then slowly injected *upwards* towards the heart, from a syringe holding an ounce. A slight obstruction was now perceived, and the vein above the ligature could be seen to be somewhat swollen. This swelling, on being felt, was very soft; and on pressing the vein from below upwards, the mixed blood and pus was readily pushed before the finger, when all obstruction to the passage of pus from the syringe was removed. The syringe was again filled, and another ounce of pus injected, without occasioning any further local effects. The animal was then allowed to get up, and exhibited no change in its normal condition whatever.

Experiment 2.—The same ass was the subject of this experiment a fortnight later, having been perfectly well in the interval. Six inches of the jugular vein in the neck were carefully dissected and exposed; and a minute aperture was then made in the upper end of the exposed vein, and the bent tube of the syringe introduced without a ligature. The coats of the vein were so transparent that the flowing blood could be seen through them. An ounce of fresh and perfectly healthy pus was then slowly injected *downwards* towards the heart, and, owing to the transparency of the vein, the yellow opaque fluid was seen to join the blood, to continue a few moments running side by side with the crimson current, until at length the vein became full of pus. On removing the syringe to obtain a fresh supply, the blood from above could be seen to join the pus, to continue side by side with that fluid, presenting a streaked red and white appearance, without any coagulation, until all the pus was carried forwards and downwards towards the heart, and the vein was again full of blood. Another syringe-full of pus was then injected, which could once more be seen first to flow with the blood, then, as its quantity increased, to take the place of the blood, and then, on the syringe being exhausted, to receive blood from above; the two mixing together, and continuing their course without coagulating, until once more the vein contained nothing but blood. The wound was now closed, and the animal allowed to rise, which he did without apparent suffering. He presented no unusual symptoms whatever during the next four days, when he was killed, and the parts carefully dissected. The vein was pervious, presented no thickening, nor cording or abscesses, and the external wound was nearly healed.

This experiment appeared to be so decisive, and so clearly opposed to the idea that the contact or mixture of pus and blood necessarily induced coagulation in a living animal, that it was thought unnecessary to repeat it. With regard to the slight coagulability apparently occasioned in the first experiment, it was attributed partly to injecting contrary to gravity, whereby the mixed pus and blood were allowed to fall backwards and remain stationary, while the ligature prevented any flow of blood from being continued. No such phenomenon was observed in the second experiment, where no ligature was employed, and where the effect of gravity was avoided by injecting downwards. In a communication, however, received from Dr Henry Lee, he had informed Dr Bennett that no ligature was employed by him.

The second experiment performed by the committee was in its nature the same as the seventh and eighth experiments of Dr Henry Lee, and yet none of the appearances observed by that gentleman resulted. There was no fulness or cording of the vein, no acceleration of respiration or constitutional symptoms; and after death no coagulation of the blood, no obliteration of the vein, nor local inflammation. What are the circumstances which occasioned this difference, the committee are not prepared to say; but the positive fact of having introduced the pus on two separate occasions, and, as recorded in Experiment 2, of having seen, through the transparent vein, the pus mix with the blood and the blood with the pus, without producing coagulation, is, in the opinion of the committee, sufficient to negative the general proposition, that whenever pus is mingled with blood in a living animal, coagulation of the latter fluid is the invariable result.

Dr Gairdner remarked, that these experiments did not necessarily disprove the conclusions arrived at by Dr Henry Lee, of London, from his observations; but he (Dr G.) considered, that further investigation into the mode of experimenting adopted by different individuals might tend to reconcile the apparent discrepancies in their statements as to the effect of pus on the blood.

Dr Gregory agreed with Dr Gairdner in thinking, that the apparently different results in experiments of this kind might be explained, partly at least, by different modes of experimenting.

COLLOID TUMOUR IN THE HEART.

2. *Dr Bennett* exhibited the heart of a woman, who had died in the clinical ward of the Royal Infirmary, labouring under disease of that organ, as indicated by a blowing murmur with the first sound, loudest at the apex. The incompetence of the mitral valve was occasioned by a tumour, the size of a duck's egg, firmly adherent to the auricle, a little above and to the outside of the auriculo-ventricular opening. It was of gelatinous consistence and appearance, of a semi-transparent light amber colour, of slightly fibrous structure, closely resembling simple colloid matter. On microscopic examination, it was ascertained to consist of bundles of minute transparent filaments, crossing and anastomosing with each other, and forming round or oval loculi. These were filled with a trans-

parent viscous fluid, in which numerous nucleated cells, of various shapes—round, oval, or fusiform—were imbedded, varying in size from the $\frac{1}{100}$th to the $\frac{1}{40}$th of a millimetre in diameter. On the addition of acetic acid, the cell-walls were partially dissolved, whilst the nucleus was unaffected. He regarded it as a transformation of the coagulum of the blood into a colloid mass.

Dr Cobbold stated, that the tumour appeared to him to consist of little else than fibro-plastic cells (like those figured by Lebert), and that on the addition of acetic acid, the cells, fibres, nuclei, and granular contents, became more distinct, while a single nucleolus appeared in the centre of each nucleus.

3. *Dr Bennett* read a communication from Dr Drummond, now at Bonn, regarding the contractile properties of the iris as explained by the action of the optic and motor nerves of the orbit, in which the recent experiments of Professor Budge of that university were detailed.

After some remarks by *Dr Bennett,* and a short discussion, in which *Mr Struthers* joined, a committee, consisting of Mr Struthers and Dr Sanders, was appointed to examine into the subject as connected with Dr Drummond's statements, and to report.

INTEGUMENT OF DORIS AND ACTINIA.

4. *Mr Dalzell* made a communication on a peculiar structure observed by him in calcareous spicula from the integument of a *doris,* where he had seen these bodies surrounded by distinct membranes, probably the secerning tissues which produced them. In some instances, by regulating the pressure and the addition of dilute muriatic acid, the author had succeeded in rupturing their envelopes, so that a continuous stream of carbonic acid was evolved, apparently from one aperture; after the escape of which, traces of the organic tissue were still discernible. He mentioned that Mr Bowerbank had described certain siliceous varieties as containing in their interior a membranous core, which heat converted into a film of carbon. The present observation, however, indicated that the animal membrane was sometimes external. He also remarked, that the blue colour of the marginal tubercles of actinia mesembryanthemum, which Cocks and some others supposed to be eyes, and in which tubercles the spermatozoon-like bodies were closely packed, was due to a dense layer of pigment, placed superficially, as already described by Johnston, which the alkalies first reddened and afterwards bleached. The muscular element of actinia, Mr Dalzell stated, was placed beneath a mucoid epithelium, and was arranged in sphincters and perpendicular bands, presenting only a very indistinct striation upon the addition of acetic acid. His remarks were in connection with a series of observations into the dermal structures of animals.

5. *Dr Cobbold* announced that he had discovered the existence of spiral fibres in the tissues of the *actinia gemmacea;* he had shown this structure to Professors Bennett and Goodsir, and was of opinion that (if not structurally) it bore functionally the character of muscular fibre. Dr Cobbold stated, that he should demonstrate this from fresh specimens at next meeting.

6. *Dr Cobbold* exhibited a coloured wax-cast of a multilocular ovarian tumour, which had inflamed, suppurated, and discharged part of its contents into the peritoneal cavity, causing death. Microscopically, the tumour presented a mass of broken-down cells and fibres, but amongst the debris were observed numerous forms of cylindrical epithelium, precisely like that found covering the intestinal villi. The occurrence of these cylindrical cells under the same circumstances had been mentioned by Dr Bennett at a former meeting of the Society. The history and post-mortem appearances in this case are reported by Professor Simpson in the "Monthly Journal of Medical Science" for December 1852, p. 524.

Dr Sanders, who had examined the tumour, remarked that, in the present instance, these cells were found lining the interior of the loculi.

CRYSTALLINE SALTS RECENTLY DISCOVERED.

7. *Dr Cobbold* exhibited a series of microscopic preparations of crystalline salts, which had been prepared by Professor Gregory.

No. 1. Hydro-chlorate of Roseo-Cobaltiack. Formula,—Co_2, Cl_3, $5\,NH_3$, HO. This (the red) salt presented numerous modifications of the octohedron.

No. 2. Hydro-chlorate of Luteo-Cobaltiack. Formula,—Co_2, Cl_3, $6\,NH_3$, HO. This (the yellow) salt exhibited varieties of the right rhombic prism.

No. 3. Copper-coloured Platino-Cyanide of Potassium. Formula, —$2\,K\,Cy + P_2\,Cy_3 + 5\,HO$. The peculiarity of this salt consists in its presenting a metallic lustre when viewed at an angle of about 45°. It crystallises in a feathery form.

No. 4. Thionurate of Ammonia. Formula,—$(C_8, N_3, H_5, O_8, 2\,SO_2) + 2\,NH_4\,O + 2\,HO$. These crystals assumed a great variety of shapes, often, as in the present specimens, resembling well known organic forms; their typical character seems to be that of a right rectangular prism.

Dr Gregory stated that the first *two* of the above salts had only recently been discovered by Claudet, Genth, and Franz.

SARCINA VENTRICULI.

8. *Mr Mercer Adam* exhibited under the microscope some blackish grumous fluid matter, which was vomited shortly before death by a woman, who died of excessive anæmia, induced by a large fibrous tumour of the uterus. This fluid was slightly acid in re-action; and in it were observed several beautiful specimens of the *sarcina ventriculi* of Goodsir, surrounded by numerous granules and loose epithelial scales.

FATTY TUMORS OF THE SKIN.

9. *Mr M. Adam* also stated to the Society the particulars of an interesting case of a child, otherwise in perfect health, whose body was covered with numerous small nodulated swellings, of various sizes. When one of these was pricked with a lancet, a fluid exuded, of a pearly white colour, and of the consistence of thick cream, which soon solidified. When examined by the microscope, it was found to contain fat cells, interspersed here and there with crystals of margarine. Mr A. stated, as his opinion, that these appearances were probably caused by obstruction of the sebaceous follicles of the skin. Mr Adam also mentioned, that Dr Drummond had informed him that he had once seen similar appearances in a child, in whose body—on post-mortem examination—encephaloma was discovered in several tissues. Probably in this case the microscope would have detected cancer-cells in the fluid of the swellings; but in the present instance it afforded a valuable means of diagnosis, and showed the affection to be purely non-malignant.

10. *Mr Barlow* exhibited a dissection of a horse's liver injected, showing the vascular connection existing between the vena portæ and posterior cava, as first described by M. Bernard.

MEETING V.—*January* 22, 1853.—Dr BENNETT, President, in the Chair.

ON THE TOUCH-BODIES OF WAGNER.

1. *Mr Dalzell* read a communication on the *tastkörperchen* of Wagner. Physiologists were aware that these bodies had excited considerable attention, and given rise to a good deal of speculation. Kölliker, Nuhn, and Gerlach

had subsequently described them; and he himself had recently made them the subject of observation. Touch-bodies had been looked for in the tongues of several of the Ruminantia, Rodentia, and Carnivora, but without success. Probably they would be found in the fingers of Quadrumana ; this supposition, however, he had not had an opportunity to confirm. The principal points to be attended to in searching for them were, to select a lean, fresh, distal phalanx, moderately dry, and to make thin sections perpendicular to the dermis, so as not to cut the papillæ obliquely. More or less throughout the whole tactile surface of the integument, but especially half way between the concentric rugæ and free extremity of the nail, touch-bodies were to be found, seldom in elongated slender papillæ, oftener in those irregularly conical, but perhaps most frequently in the compound papillæ, in which they sometimes occurred in pairs. Viewed after the addition of acetic acid, they appeared as distinct, more or less oval structures, occupying either the upper part or side of the papillæ, and covered externally with very distinct, elongated, transverse nuclei. Sometimes they presented a regular outline; at others, were lobed transversely; and occasionally that appearance was complicated by a vertical furrow, as described by Nuhn.

Ether and turpentine did not affect them; but Gerlach's process of preparing the section with alcali, though perhaps necessary in injected subjects, seemed to him to alter considerably the appearance of the parts; for the abstraction of the fatty matter was followed, on the addition of acetic acid, by a certain amount of coagulation and contraction of the tissues.

On transverse section, these bodies presented two appearances, which might, however, be the same in different stages of development. In one, as described by Nuhn, there was a distinct hyaline centre, surrounded by a nucleated cortex, composed of fibres and spindle-shaped cells. In such sections the author had never detected the cut ends of nerves. The other form, which was equally common, only differed from that already described by the absence of a distinct central portion, and appeared to be entirely made up of elongated spindle-shaped cells, with irregular nuclei, smaller striæ, and occasional granules. In some of such sections he had very distinctly seen two or even four regularly-edged pale openings, *which might be the ends of tubes.* He had never seen, in connection with these bodies, the division of the double contour nerve into pale fibrils, as described by Wagner—an appearance which Gerlach had only seen twice, and neither Kölliker nor Nuhn had detected at all.

Mr Dalzell stated that some possible causes of fallacy were present in viewing the so-called touch-bodies in transverse section. Nuhn had described them optically as funnel-like hollows. These hollows, he had no hesitation in saying, were not the structures of Wagner, but either the depressions between the papillæ, from which the deep columnar cells of the mucous layer had been detached, or the ends of the tortuous portions of sweat ducts as they entered the corium. This statement was corroborated by the fact, that these funnels occurred in all the corresponding parts of the integument, whilst the bodies of Wagner were found only in some.

With regard to their relation to the nerves, the author stated that a nervous bundle was generally seen at no great distance from the papillæ in which they were contained. Owing to the difficulty of making the section in the line of the ascending nerve, it was only occasionally that one or more nerves could be seen to pass continuously to the base or side of the corpuscle, and still less frequently could these be traced returning from it. From a great number of observations, however, he had arrived at the following results:—That sometimes from two to four perfect nerve-tubes reach the base or side of the touch-body, and either loop upon or over it, or abruptly disappear. That still oftener they pass external to it, and seem to terminate on the surface of the papillæ, as described by Kölliker. But, that it must not be forgot, that the passage of the knife across the section or the pressure afterwards used, might influence either of these appearances,—*first,* By bringing the nerve in contact with the body; and, *second,* By removing it from it.

He begged to call the attention of the Society to the following facts:—

First, That Wagner's division of the papillæ into purely nervous and vascular had no anatomical foundation, for even those in which his touch-bodies were found very frequently contained one or more vessels.

Second, That we have good reason to conclude that every papilla in which a touch-body is lodged, receives from one to four nerve-tubes, with which it sometimes is, and sometimes is not, in immediate contact.

Third, That the parts of the integument in which these structures are found are eminently tactile; but that their number varies considerably in different individuals, and that they sometimes are either not present at all, or escape detection, even when every portion of the integument is carefully searched.

Fourth, That they are not fatty or nervous convolutions, as supposed by Gerlach, but are composed of condensed imperfectly-developed cellular tissue, with or without a hyaline centre; and that, so far as his observations went, the existence of nerves within them had not been detected, but that these were either looped externally, or cut off abruptly at various points.

From these facts he concluded, that whatever view was adopted of the histological relations of these bodies to the nervous element; and even admitting the somewhat doubtful observation of Wagner, as to the filamentous division of primitive nerves within their substance, Kölliker's theory seemed to convey the most probable explanation of their function,—viz., that they perhaps act as *cores* against which the nerves are pressed, a process by which, just as a foreign body produces irritation, so an organic subcutaneous induration might exalt the peripheral sensibility of the part. He did not feel prepared to admit that they were special apparatuses of tactile, as opposed to common sensibility, at least in the degree to which Wagner and others had elevated them. Observations on their development appeared likely to throw light on their real character.

SPIRAL STRUCTURE OF MUSCLE.

2. *Dr Cobbold* exhibited under the microscope spiral muscular fibres, from the tentacula of *actinia gemmacea.* Dr C. stated, that at first sight they appeared to consist only of single coils or threads; but on a more careful examination he was satisfied that the spirals in question were severally made up of twin fibres, such as Dr Martin Barry had pointed out as obtaining in the case of ordinary muscular fibre. The different appearances presented by these fibres was, he believed, fully illustrated by the series of wire models (on the table), which Dr Barry had politely forwarded. Dr Cobbold also showed several preparations of muscular fibre from the human fœtus, and from a lobster (*astacus norvegicus*). The appearances presented by these he also believed to be confirmatory of Dr Barry's observations. The only structural difference traceable between the muscular fibres of the human subject and those of actinia just mentioned being, that in the former the double coil is surrounded by a delicate transparent membrane (hyaline), whereas in actinia no such covering exists.[1]

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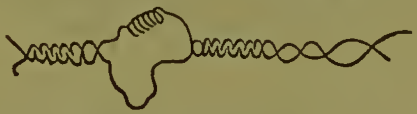
[1] The accompanying figure is a representation of one of the "muscular fibres" from the tentaculum of *A. gemmacea,* seen under a magnifying power of 300 diameters. In



this instance the twin coil was partially unwound, and in such a manner as to explain several appearances, concerning which different views have been taken. Mr Busk (to whom I forwarded a preparation of these fibres) informs me, that he has been long familiar with these "spirals" as the "*prehensile filaments,*" or threads, which are abundant in the medusoid or hydroid class of animals. Notwithstanding the function thus ascribed to this tissue, Mr Busk believes that they have nothing to do with the muscles of actinia. Mr Busk does not recognise the "*double*" coil, to which I attach much importance.—T. S. C.

3. *Dr Cobbold* exhibited the spermatozoon-like bodies so abundant in the stomachial membrane and other parts of actinia. These bodies, described by Wagner (in Weigman's *Archiv*, f. 1835, Bd. ii., S. 215) as true spermatozoa, are now generally recognised as stinging organs. The Society's attention is called to them, as they have been frequently confounded with the mineral bodies alluded to at a former meeting of the Society; and further, because in their unexpanded condition they have been mistaken for the "spiral muscular fibres" just demonstrated.

4. *Dr Gairdner*, on behalf of *Mr John Kirk*, made a communication, accompanied by drawings and a demonstration, to illustrate the apparent spiral structure of muscular fibre in the fœtal calf. Mr Kirk had in the course of last autumn been engaged in the examination of fœtal muscular fibre, and had become convinced that in the mammalian fœtus (the calf being the one examined by him) a double spiral might be distinctly demonstrated within the sarcolemma, and occupying the situation of the so-called transverse striæ of adult muscle. He had viewed this spiral structure under every conceivable aspect, had employed numerous re-agents, and had, by repeated examinations, secured himself against accidental sources of fallacy. He had, moreover, observed the mode of formation of the ultimate fibrillæ of muscle, from the spiral structure above mentioned. By the addition of tincture of iodine, and afterwards of acetic acid, the spiral fibre was distinctly resolved into a succession of minute beads or particles arranged spirally in linear series. When the spiral was completely closed up, the beads or particles of successive coils formed also linear series in the axis of the fibre, just as the ideal spiral in the stem of a plant sometimes produced an arrangement of its buds so as to form a series, apparently independent of the original type. In the adult, a primitive fasciculus was capable of splitting under different conditions, either into longitudinal fibrillæ, or into transverse discs; the latter were separated rings of the closed spiral, the structure of which could be clearly demonstrated only in the fœtal muscle, in which it could be drawn out to a considerable extent without fracture. Mr Kirk admitted the impossibility of showing these facts satisfactorily in one or two demonstrations, but was anxious to have an opportunity of bringing them before a committee of the Society.

After considerable discussion, arising out of the appearances presented by these demonstrations,

Dr Bennett observed, that attentive examination of the various demonstrations now before the Society had convinced him that the structure discovered by Dr Cobbold in the integument of actiniæ was really that of a spiral filament; but he saw nothing which exhibited the existence of spirals in mammalian muscular fasciculi in the numerous beautiful demonstrations of that tissue, either by Dr Cobbold or Mr Kirk. The various drawings of double spirals shown by Dr Cobbold, although in his opinion confirmatory of Dr Martin Barry's views, were in no way confirmed or supported by the structures now exhibited to the Society. But as the subject was one which could not be determined by discussion, but only by investigation and careful observation, he proposed that a committee be named for that purpose.

This was agreed to, and Dr Dobie, Dr Sanders, and Mr Barlow, were appointed a committee to examine Dr Cobbold and Mr Kirk's preparations, and report on the subject at a future meeting of the Society.

5. *Dr Gairdner*, in the absence of *Dr Dobie*, exhibited a specimen of melanotic cancer, occurring in a toe, which had been amputated by Mr Syme. The tumour had been growing for upwards of two years; it commenced on the outer side of the great toe, in the form of a small corn, subsequently it became painful, and occasionally bled pretty profusely. At the time of the patient's admission to the hospital it nearly surrounded the great toe, and extended over its metatarsal bone, which was removed along with the tumour. The tumour was only partially melanotic; it contained numerous large cells, which, in the melanotic parts, contained the usual granular pigment.

MEETING VI.—*February* 5, 1853.—Dr BENNETT, President, in the Chair.

1. *Dr Bennett* exhibited a calvarium, of curious irregular shape. There was a depression at the upper and middle part of the frontal bone; and the bulgings of the bone laterally destroyed the symmetry of its right and left halves. The specimen was from the body of an aged female.

THE STRUCTURE OF THE HAIR.

2. *Mr Dalzell* communicated to the Society the result of his observations on the structure of the parts involved in the production of the hair. They were for the most part confirmatory of the statements of Kölliker. The appearance of the longitudinal fibrous, transverse nucleated, and structureless coats of the follicle, were exactly what Kölliker had described; but Mr Dalzell had determined the continuation of the basement membrane *over the papilla*, where Kölliker had not been able to trace it. There could be no doubt that a distinctly defined papilla was present in every follicle, and not a mere "layer of papillary pulp," as suggested by Todd and Bowman. The form of this structure was that of a sphere, slightly elongated superiorly, and attached by a thin pedicle to the base of the follicle; and the author believed that the upright elongated cells, forming the external layer of the outer root sheath, were repeated more or less distinctly upon its surface. Kölliker had mentioned that no one, without the assistance of injection, had ever seen the vessels of the papilla; and many observers, as Hassal and Günther, had, for the same reason, even denied their existence. He had, however, frequently observed them in the tactile follicles of the young mouse, where they appeared as red lines in the pedicle, and might be followed even into the central pulp, provided the animal was newly killed. The author stated that Henle's description of the fenestrated membrane was generally accurate, but that the apertures which he had described as oval were in reality narrow splits. He could not account for Kölliker's describing it as a polygonal cell membrane, with occasional openings; for it was, except at its inferior limits, composed entirely of laterally anastomosing fibres of a clear hyaline texture, which, when undisturbed, appeared as a viscous layer, but was easily resolved by pressure into a net-work of flattened bands. A curious variety of Huxley's cells was present in some of the lower Rodentia, in which from five to nine nuclei were found, and the cell-walls exhibited puckerings at the points where these bodies were attached. Unless attention was paid to the relation of the parts, it was possible to mistake the open striæ of the hair cuticle (found at the neck of the bulb) for the netted fibres of Henle's sheath. Mr Dalzell illustrated this statement by drawings, and described the importance of the imbricated layer, which inferiorly, by its transversely elongated cells, formed a band of restraint to the fibres of the shaft, and superiorly protected the hair from mechanical injury, by its flattened and impervious horny plates. Respecting the innervation of ordinary hairs, the author believed that the pain experienced on extracting them depended on their connection with the surrounding parts; and that the traction of the follicle, rather than the mere extraction of the hair, was the cause of pain. Occasionally, however, and especially about the lips and cheeks, nerves might be seen passing upwards among the follicles, into which they might possibly be directed; but he was not aware that they had ever been seen to enter them. He had, however, satisfied himself, in reference to the tactile hairs, that after two or three nervous bundles of considerable size had entered their outer coat, the nerve-tubes were spread out on its inner surface; that they next divided into two or more branches, after which, losing the white substance of Schwann, they appeared as pale lines, or parallel striæ, and ultimately faded into the surrounding tissue, but never, so far as he could discover, had their termination in loops. In many instances no division of the nerve could be detected, but the other appearances were constant. To the tactile bristles of the seal the nervous supply was very large, but for observation Mr Dalzell preferred the young

tactile follicles of smaller animals where the parts were clear and no dissection necessary. His observations on this subject received confirmation from the discovery of similar terminations in other parts by Henle, Schwann, Hannover, and Todd and Bowman; but it was to be regretted that the disappearance of the physical character of the nerve-tube, which followed the loss of the white substance of Schwann, put it out of the power of the observer to trace them entirely out.

EFFECTS OF ANTIMONY ON THE HORSE.

3. *Dr Haldane* gave the result of some experiments on the urine of a horse to which large doses of tart. of antimony had been administered. It was a remarkable fact, that doses of an ounce, or even larger quantities, of tartar-emetic could be administered to the horse for a length of time, without producing any effect whatever. In the urine of a horse so treated, Dr H. had, by careful analysis, detected antimony, but only in very minute quantity.

MEETING VII.—*February* 19, 1853.—Dr BENNETT, President, in the Chair.

1. *Dr Sanders* showed a biliary calculus taken from the cystic duct, together with a small oval-shaped concretion, white, soft, and resembling putty in appearance, from the same situation. The soft concretion, examined under the microscope, presented numerous crystals of cholesterin, radiated circular crystals of carbonate of lime, similar to those found in the urine of the horse, and acicular crystals soluble in nitric acid with effervescence.

Dr Bennett observed that cholesterin belonged to the fatty matters elaborated during the secondary disintegration of the textures, which are quite distinct physiologically from the primary fatty element of nutrition present in the chyle. In tubercular phthisis, Dr Bennett believed the latter, that is, the fatty or oleaginous element of nutrition, to be deficient, whilst the former, the fatty products of disintegration, are frequently in excess, as observed in the fatty liver, common in that disease. He was of opinion that these different classes of fatty compounds might, in the living body, be converted into one another, but the laws which regulated their transformation were as yet unknown. The distinction, however, should be remembered in our attempts to explain the rationale of the treatment of phthisis pulmonalis by cod-liver oil. Some discussion ensued, in which Drs Bennett, Gairdner, Sanders, and Cobbold, took part.

2. *Mr Barlow* exhibited, under the microscope, a fine transparent blue injection of the blood-vessels of the hair follicle.

3. *Mr Dalzell* showed, under the microscope, a demonstration of the epithelium developed in the claspers of the male frog during the copulative season.

CONGENITAL DISPLACEMENT OF HEAD OF FEMUR.

4. *Mr Mercer Adam* exhibited a dissection he had made of a fœtus, having congenital displacement of the head of the femur (*luxation originelle* of Breschet, etc.) on both sides. Opportunities of examining this malformation in fœtal life, as was long ago observed by Dupuytren, were very rare; hence the present case was interesting. The head of the femur was displaced from a well-formed cotyloid cavity, and lay on the dorsum of the ilium, where it had formed for itself a new cartilaginous acetabulum. The muscles of the thigh and gluteal region were very much atrophied and contracted. Owing to the contraction of the rectus femoris, the patella and head of the tibia were drawn up over the condyles of the femur, and the knee-joint in consequence could not be flexed. The axis of the neck of the femur was abnormal, being placed nearly horizontally in relation to the shaft of the bone, instead of its natural oblique direction. The ligamentum teres was elongated, thicker, and stronger than is usual in

fœtal life. This seemed to confirm the views entertained of its function as a purely suspensory ligament, and evidenced in a remarkable manner the provision made by nature to counterbalance the malformation; for, had this child lived, the whole weight of the body must necessarily have been supported by this ligament, which was formed of unusual strength for this end. From the immobility of the knee-joint the fœtus had been unable to assume its normal ovoid form while *in utero*, and accordingly a false joint had been formed in the lumbar region of the vertebral column, to enable the child to adapt itself to the cavity of the uterus. Mr Adam made a few remarks on the probable etiology of such cases; and considered that in the present case the displacement had been caused by the abnormal retraction exercised on the head of the bone by the contracted condition of the muscles affixed to it. The position of the fœtus in utero, as it lies with the legs flexed on the abdomen, was the position of all others which would predispose the head of the femur to slip out of the acetabulum, and to mount upwards and backwards, as in this case, on the dorsum of the ilium.

MEETING VIII.—*March* 5, 1853.—Dr BENNETT, President, in the Chair.

1. *Mr de Chaumont* read the following communication

ON THE EFFECTS OF CHLOROFORM ON THE BLOOD.

Much controversy has arisen as to the real nature of the effect of chloroform on the blood. Amussat, Sédillot, etc., have contended that the blood is darkened by it, and that the effect is quite analogous to asphyxia. Gruby, on the other hand, contends that not only is the arterial blood not darkened but that the venous blood is even rendered as bright as the arterial. I have found that when blood is agitated with chloroform it does not coagulate, but becomes quite transparent; and when the blood is venous the colour is rendered as brilliant as that of arterial blood. Sulphuric ether, on the contrary, does not affect the colour of venous blood. Chloroform seems thus to have a special effect of brightening colours, not only in this but in other cases; as, for instance, when it dissolves iodine, the solution has not the deep-brown colour obtained when water, alcohol, etc., are used, but has the beautiful violet hue of the vapour. In some cases chloroform restores the colour of old blood stains on linen, etc., but the effect is not constant. When blood, acted upon by that agent, is examined by means of the microscope, the red globules are found completely dissolved, the field presenting only a homogeneous coloured expanse, in which the white globules float unaffected. Chloroform acts on pus very similarly to acetic acid, as it brings into view the double and tripartite nuclei of the globules, although the effect is not so speedily accomplished as by acetic acid. When the blood of leucocythemia is acted upon, the red globules dissolve, and the white present the reaction not of the ordinary white globules of the blood but of pus. With the view of observing the effects of the administration of chloroform on the blood in the living body, I attempted to anæsthetise a rabbit by the rectum, so as not to interfere with the respiration. Although two drachms were injected no other effect was produced except an intoxicated appearance, which did not give immunity from pain. This corresponds with what was observed by Flourens in the early days of etherisation. Another rabbit was anæsthetised by inhalation in the ordinary way, and died suddenly during the operation. On opening the body the lungs were found florid, and without trace of asphyxia; the auricles of the heart continued to contract for an hour after death; the peristaltic action of the intestines and bladder continued also with tolerable vigour. Venous blood from this animal presented the same reactions as before mentioned. The next experiment was upon mice. Four of these animals were placed alive in a wide-mouthed bottle, and a few drops of chloroform poured into the bottom of the vessel. This speedily caused a great excitement among them, and they soon after died. The examination of their bodies showed the same signs as in the rabbit. The brain was also normal. Another rabbit was anæsthetised by the lungs, and the crural vessels of the right leg exposed and carefully watched during the whole process of inhalation, but without there being any evidence of change in the colour of the venous or the arterial blood. In this animal also an attempt was afterwards made to induce insensibility by the rectum, but without success. The chloroform was, in this case, mixed with water, and the intoxicating effect produced was greater and continued longer than in the former. The temperature was also apparently lowered, although no exact observation by the thermometer was made. Duméril and Dumarquay have stated that the temperature is lowered in anæsthesia, and under the influence of ether and alcohol, distinguishing the effects of these agents from common narcotism, as by laudanum, in which the temperature is raised. This last rabbit died after a few hours, and the post-mortem appearances showed that death had been occasioned by acute peritonitis. Here, too, there were no signs of asphyxia, the lungs being of a bright rose colour. In the liver was found a cyst, containing a white putty-like mass, which, under the microscope, showed beautiful oval-shaped cells containing a round nucleus, with several, generally three, oval nucleoli. These, Dr Bennett informed me, were entozoa. The action of chloroform on them was curious ; the nucleus swelled up so as to fill the cell, while in another part of the field were seen cells floating empty, and nucleoli floating about in threes, joined by filaments. Hence it seemed as if the nucleus had alone been dissolved, a curious fact when taken in connection with the solution of the red globules of the blood, these being also considered as nuclei.

The above experiments were all subsequently confirmed by a committee of the Royal Medical Society, by whom it was also observed that chloroform dropped upon the intestines and bladder caused violent peristaltic action, and that dropped upon the heart, while that organ was contracting, it caused a cessation of the pulsations until it had all evaporated, having a temporary paralysing effect on that organ.

From the above experiments I am inclined to think that chloroform does not act by asphyxia, and that, when this does occur, it results from the manner of the administration : that its action is directly upon the nervous centres, first upon that part connected with the perception of sensation, and lastly on the spinal cord, or generator of motive force : that although it arterialises the colour of the venous blood out of the body, I have not yet been able to observe the same effect in the body : and that, on the other hand, the arterial blood is in no way affected in colour by its inhalation.

Dr Bennett referred to a report on the action of chloroform drawn up by himself, and printed in the Transactions of the Edinburgh Medico-Chirurgical Society about the time when chloroform was introduced as an anæsthetic. (*Monthly Journal*, Jan. 1848). The results of the experiments there detailed were similar in some respects to those of Mr de Chaumont.

Dr Mathews Duncan remarked, that rabbits were not good subjects for experiments with chloroform, on account of the rapidity with which fatal effects succeeded the anæsthesia. From recent trials, he was convinced that chloroform introduced into the stomach could produce anæsthetic effects.

A committee, consisting of Drs Dobie, Sanders, and Mr M. Adam, was appointed to report on this communication in reference to Mr de Chaumont's admission as a member of the Society.

MENSTRUATION AND SUPERFŒTATION.

2. *Dr Mathews Duncan* exhibited to the Society a dissection of a gravid uterus, at about the end of the second month of pregnancy. He specially pointed out the mucous structure of the decidua vera, and of the decidua reflexa, and the open state of the Fallopian tubes and cervix uteri up till this period. The adherent plug of cervical mucus was also well seen.

The preparation illustrated the possibility of the menstrual discharge, which occasionally occurred in early pregnancy, being derived from its ordinary source, the lining membrane of the cavity of the uterus. This might be the source of the discharge till the cavity of the uterus was completely occluded by the contact and coalescence of the decidua vera and reflexa, which took place in the third month of pregnancy. The only obstacle to the issuing of the discharge from the uterus was the cervical mucus. But this was also present in the unimpregnated organ, and had to be displaced or opened up for each ordinary menstrual period.

On the same grounds, Dr M. Duncan believed that superfœtation might take place up till some time in the third month of pregnancy. The communication between the vagina and the ovaries was quite free up till that time. By supposing the first child, in a case of superfœtation, born at the end of the seventh month, and already viable, and the second to have been conceived in the end of the third month of the pregnancy of the former, an interval of five months is gained between the births of viable children, a space of time that will include and explain most authentic cases of this occurrence.

Dr D. also made some remarks on the fanciful notions of authors as to the function of the decidua reflexa, in regulating the motions of the ovum on its entrance into the uterus, and showed that they were untenable. (See *Monthly Journal of Medical Science*, April 1853, p. 326).

MEETING IX.—*March* 19, 1853.—Dr BENNETT, President, in the Chair.

The reports of the committees recommending members for admission having been read, the following gentlemen were balloted for, and unanimously elected members of the Society:—Dr Mathews Duncan, Mr F. S. B. F. de Chaumont, and Mr John Kirk.

1. *Mr Barlow*, on the part of the committee on the spiral structure of muscle, exhibited a demonstration which he had made of the primitive muscular fasciculus (elementary fibre of Bowman) from the fœtal calf, in which the dark transverse striæ were seen to cross each other obliquely, giving rise to the appearance of a spiral arrangement.

Dr Bennett considered, that the appearance presented was to be explained by the polygonal shape of the fibre, and did not indicate a spiral structure.

2. *Mr Kirk* showed a solution of arsenious acid prepared according to Harting's directions (*Monthly Medical Journal*, 1852, p. 375), in which vegetable mould had appeared, although the solution had been made and preserved with care.

CONFERVÆ ON THE PLEURA.

3. *Dr Gairdner* exhibited a portion of tubercular lung, in which perforation had probably taken place, establishing pneumothorax. In the pleural surface were developed a large number of white circular deposits, varying in size from extreme minuteness to $\frac{1}{8}$th of an inch diameter, and extending about $\frac{1}{16}$th of an inch into the substance of the lung. Under the microscope they presented a structure of the lowest fungoid type, consisting of a mass of very minute oval bodies, sometimes arranged in linear groups of three or four, and insinuating themselves between the fibres of the original tissue. After remaining in contact with a portion of kidney for two hours, similar deposits were found on its surface; but on further exposure for several days, to air and moisture, they were observed to have undergone no change.

Dr Bennett remarked, after examining the preparations, that the vegetable growth now exhibited was the most simple in its formation ever yet described, and was exceedingly interesting in a histological point of view.

TRICHINA SPIRALIS.

4. *Dr W. T. Gairdner* exhibited specimens of trichina spiralis in the pectorali major and muscles of the thigh, of a man æt. 60, who died after an injury, apparently from purulent infection of the blood. Nothing was known of his previous history as regards the muscular system.

The parasite was found in all the voluntary muscles examined, and generally in all the muscles having striated fibre, except the heart. Several of the worms were found in the recti muscles of the eyes, and in the constrictors of the pharynx, as well as in the upper part of the œsophagus. The cysts enclosing the parasite appeared to be disposed in the interstices of the muscular fasciculi, which were in no case observed to be subdivided by the foreign body. The cysts were almost universally quite opaque from calcareous matter, so that the contained worm could only be seen after steeping the fibre in dilute muriatic acid. Surrounding the spindle-shaped extremities of the cysts, there was seen, almost invariably, a number of rounded yellowish vesicles, having the character of fat vesicles of very small size. The muscular fibres, although rather dry and pale to the naked eye, presented nothing unusual under the microscope.

The structure of the parasite has been carefully studied by various members of the Society. Dr G. referred to Dr Sanders and Mr Kirk for a description of some points more in detail. His own observations had borne out generally the descriptions of Owen.

The animal was evidently a nematode worm, without any very distinct internal organs, and spirally coiled up within a double cyst, of very constant appearance and form. Dr G. said he had not been able to detect more than two layers in the cyst; but it was possible the inner layer (which, according to his observations, was of considerable thickness and transversely nucleated) might have yet another thin hyaline membrane on its internal aspect. Both layers of the cyst were spindle-shaped externally; but the cavity in which the worm floated was quite spherical, and filled with a granular matter. The whole appearance of the parasite was such as seemed strongly to bear out Owen's view, that it was merely the first stage of an animal destined for further development. Dr G. thought it very probable that the muscle was only the hot-bed of ova, which, for their development into perfect animals, required some other habitat. Considering it to be not unlikely that this further development of trichina might take place in the intestinal canal of some carnivorous animal, Dr G. had sent specimens of the muscles of this man, in the fresh state, to Mr Barlow, who had kindly consented to take up the inquiry, and had accordingly administered portions of the muscle to dogs and cats, which he intended to keep under notice for some time, if possible. Should any results of importance accrue from this experiment, Mr Barlow would lay them before the Society.

5. According to *Dr Sanders'* observations, with which those of *Mr Kirk* mostly agreed, the arrangement of the cysts comprised,—1st. An external cyst of fibrous tissue, in which the mineral matter was lodged; it was generally of an elongated spindle-shape, but in some apparently younger cysts was more rounded. Internal to this was,—2d. A tolerably thick layer of a white transparent homogeneous substance, which did not present any distinct structure; but, under the action of re-agents, as hydrochloric acid, exhibited concentric marks. This substance filled the space between the outer elongated, and 3d. The inner spherical cyst, which contained a granular material, and one, rarely two, trichinæ closely coiled up. This inner cyst was much smaller than the outer one. When well seen, it presented a very finely striated appearance, which Dr Sanders thought was owing to minute cilia, but which was considered to indicate fibres by Mr Kirk and Dr Gairdner.

When the granular matter contained in this inner cyst was effused, it consisted of a plasma, some granular matter, and cells, generally clear, with a single small nucleus, sometimes larger, and containing granules. Mr Kirk thought that these cells were arranged as an epithelium on the interior of the inner cyst.

In the white homogeneous substance placed between the outer and inner cysts, there was sometimes observed, near the narrow end of the cyst, a small round body or vesicle, generally surrounded by granular matter. It was also noticed that a small cyst was occasionally attached at the spindle-shaped end of a larger one; in some examples, conveying the notion that the extremity of the cyst had become elongated, and had afterwards separated to form a new one. It is, therefore, possible that, by means of the vesicle just mentioned, and the process of elongation and division, the trichinæ may be propagated, although it is obvious from the great multitudes of them, and uniformity in their appearance and stage of growth, that some general method of deposition must have taken place. The blood and the surrounding muscular texture were examined, without any traces of their ova being found.

A lengthened discussion ensued, in which Drs Bennett, Gairdner, Sanders, Cobbold, and Mr Kirk, took part.

EXTRA-UTERINE FŒTATION.

6. *Dr Cobbold* exhibited a dissection which he had received from Mr Goodsir, taken from a case of extra-uterine fœtation within the Fallopian tube, which had proved fatal by rupture, at about the twelfth week of gestation. It was stated at last meeting, during the discussion, that in several instances of tubal fœtation, where only one corpus luteum was present, that body had been found in the ovary of the opposite side; and a case of this kind had lately come under Dr Simpson's notice. In the present instance, as also in a very similar case reported by Dr C. in the "Provincial Medical Journal" for 1847, one corpus luteum only was present; but, in both these cases, it occurred in the ovarium corresponding to the side on which the tubal gestation had taken place. The Society's attention was, in particular, directed to the very anomalous position of the left Fallopian tube, the connection between it and the uterine cavity being situated at the cervix uteri, and not on one side of the fundus, as usual. A similar mal-position is recorded by Dr Granville, in the "Philosophical Transactions," accompanied with an engraving of the parts.

7. A specimen of tape-worm, 15 feet long, was shown, which had been expelled by means of the ethereal extract of the male shield-fern (Nephrodium filix mas.)

EXAMINATION OF THE HUMAN MILK IN LEGAL MEDICINE.

8. *Mr Mercer Adam* called the attention of the Society to a new and important use of the microscope in legal medicine. He remarked that there were few cases in medical jurisprudence more difficult to decide than whether, after a few weeks had elapsed, parturition had occurred recently or at a remote period. In such cases of doubt, where delivery is circumstantially believed to have recently occurred, but where all the physical signs may, with equal propriety, be reckoned evidences of this having been at a remote period, he believed that the detection of colostrum corpuscles in the milk would at once decide the question, and, almost with certainty, prove the delivery to have been recent. In illustration of this, he cited the following case, which had recently come under his notice. The body of a newly-born child, much decomposed, was found in a moss in the south of Scotland. It was impossible to decide *secundum artem* whether it had been born alive; but it appeared to have been dead for four or five weeks. Proceedings were taken to discover the mother, and suspicion fell on a young woman who was *supposed* to have been secretly delivered about four or five weeks previously,—that is, about the same date as the infant was thought to have been exposed. On being arrested on the charge of concealed pregnancy, she said she had had a child a year and a-half before, which she had nursed till within three months of her apprehension, and firmly denied having been recently delivered. The two medical men, who were judicially appointed to examine her, came to different decisions, so equivocal were all the signs, as to the period which had elapsed since her delivery.

A microscopic examination of her milk was suggested, and it was found to abound in colostric globules. This decided the *questio vexata*, and showed parturition to have lately occurred. The girl, on being told that imposture no longer availed, confessed having recently given birth to a still-born child, thereby confirming the accuracy of the revelations of the microscope. Mr Adam considered, that in such cases, the microscope was likely to be as serviceable to the medical jurist as it was in the detection of blood globules, spermatozoa, etc.

Meeting X.—*April* 2, 1853.—Dr Bennett, President, in the Chair.

1. *Dr Bennett* made some observations on the structure of the trichina spiralis, at the same time exhibiting some prepared specimens.

2. *Mr Mercer Adam* exhibited a uterus, in the broad ligament of which the following abnormal appearances were observed. The extremity of the fallopian tube was swollen and dropsical, and the ovary was much atrophied; towards it there ran a very tortuous vessel, much distended, and resembling the vas deferens, so as at first sight to give the appearance of lateral hermaphroditism. On dissection, however, this vessel was found to be an obstructed bloodvessel (probably one of the uterine veins) filled with solid fatty matter.

DISEASED PLACENTA.

Mr Mercer Adam exhibited a placenta which he had taken from a woman who aborted, for the fourth time, at the sixth month of utero gestation. It was atrophied, and presented, in a very marked degree, all the characteristics of fatty degeneration. On a section being made of it, several large blood clots were found, similar in appearance to what Cruveilhier has figured as apoplexy of the placenta. These on the centre presented a gangrenous aspect. Mr Adam made a few remarks on the frequency of these diseased conditions as causes of abortion, and on the beneficial effects of chlorate of potash, as pointed out by Professor Simpson as a remedial agent in such cases.

Meeting XI.—*April* 16, 1853.—Dr Bennett, President, in the Chair.

1. *Mr Mercer Adam* exhibited the dissection of a male fœtus, born at the full time, malformed in the following manner:—There was a perfect double hare-lip; diaphragmatic incompetency; and abnormality of the external genitals. As regards the latter organs, no penis was visible externally, the skin of the abdomen being uninterruptedly continuous with that of the scrotum. There existed no vestige of an external preputial opening. On an incision being made through the integuments, an imperfectly formed penis was discovered, having a meatus urinarius, which admitted the point of a small probe. The testes had not descended into the scrotum. On the left side the diaphragm was undeveloped and incomplete, so that the stomach, the intestines, and one lobe of the liver, lay in the thorax, displacing the heart to the right side, and, by compression against the ribs, causing atrophy of the left lung. Mr Adam said that, while diaphragmatic incompetency, such as this, was by no means rare, he was not aware of any case recorded having a similar malformation of the genitals.

2. *Mr Kirk* showed the parts of an eye much altered by chronic disease. Bony deposit had taken place in the posterior chamber, and the lens had undergone ossification. Preparations displayed under the microscope showed that these osseous formations presented the *corpuscles of true bony texture*.

Dr Bennett remarked on the novelty and importance of this observation in a pathological point of view, and as a contribution to the *minute morbid anatomy* of the eye,—a subject on which comparatively little was as yet known.

4. *M. Chaumont* exhibited a demonstration of the blood acted on by chloroform, showing the gradual solution of the cell-wall of the red corpuscles, and, in

answer to a question from Dr Bennett, suggested the following explanation of the re-action :—

The effect of chloroform is in this case very like that of acetic acid, only it takes place more slowly. Ether has no similar effect. Now, looking at the composition of these substances, we shall find that the solvent effect is manifested in the direct ratio of the electro-negative nature of the re-agent. Thus, acetic acid is $C_4H_3\ O_3$ (leaving out of view the equivalent of HO), chloroform is $C_2\ H\ Cl_3$, and ether is $C_4\ H_5\ O$. We may, for convenience, consider the two radicals $C_4\ H_3$, and $C_2\ H$, to be about equal in electro-negative properties, the difference between them not being so great as to require to be taken into account here, and representing them by Ac and Fo, we shall have

Acetic acid, = $Ac\ O_3$
Chloroform, = $Fo\ Cl_3$
Ether = $Ac\ H_2\ O$

Now, it is plain that these stand at present in the order of their electro-negative relations, for chlorine is less electro-negative than oxygen, and hence chloroform is less electro-negative than acetic acid, since the oxygen of the latter is replaced by chlorine in the former. Again, in ether, the three equivalents of oxygen or of chlorine, are replaced by one of oxygen and two of hydrogen; and as the latter element is the electro-positive "par excellence," it is obvious that ($H_2\ O$) must be more electro-positive than either O_3 or Cl_3; and, in consequence, that ether must be less electro-negative than either chloroform or acetic acid; and this is the order of things observed in their re-actions with the blood corpuscles —acetic acid dissolves them speedily; chloroform dissolves them but more slowly ; ether does not dissolve them at all. The action is thus directly, as their electro-negative, or inversely, as their electro-positive natures, for albuminous substances, and the opposite in the case for fatty substances—ether dissolving them with facility ; chloroform still dissolving them but less easily; and acetic acid not at all.

OSSIFICATION OF CARTILAGE.

5. *Mr Kirk* exhibited a preparation illustrating the ossification of cartilage, as seen in the calcaneum of the human six months' fœtus, showing that, throughout the hyaline matter around the circumference of the centre of ossification, there were numerous isolated, distinctly fibrous or crystalline deposits, which gradually enlarged, and became united with the previously formed spicula.

At first these deposits consisted of three or four straight fibres crossing each other; gradually the number of the fibres became increased, so as to present, in the centre, an amorphous granular aspect, while around the circumference the fibrous structure was evident.

MEETING XII.—*April* 30, 1853.—Dr COBBOLD, Vice-President, in the Chair.

PHOTOGRAPHY.

1. *Dr Cobbold* exhibited to the Society a photographic camera, of very simple construction, which had been made by Mr Bryson of this city, and adapted to a Ross microscope. This apparatus appears to answer its purpose very well, in proof of which Dr C. laid before the Society several *positive* and *negative* representations of animal tissues taken by Dr Robertson, Dr Broadbent, and himself, by means of the collodion process,—the highest lens used being a $\frac{1}{4}$ inch. The following illustrations were in particular worthy of notice :—(1.) Section of human fœtal kidney, minutely injected by Drs Robertson and Broadbent, with the transparent blue injection recommended by Schrœder van der Kolk. (2.) Section of fossil mammiferous bone. (3.) Section of pearl. (4.) Section of shell, Cypræa Tigris.

Dr Cobbold proposed to take photography with higher magnifying powers ($\frac{1}{8}$ inch object glass), and promised to bring the results under the notice of the Society.

2. *Dr Bennett* mentioned, that since last meeting he had received a specimen of supposed fatty placenta. The circumference of the organ presented to the naked eye the appearance of fatty degeneration; on examination with the microscope, however, the textures were found anæmic, but perfectly healthy.

MEETING XIII.—*May* 14, 1853.—Dr BENNETT, President, in the Chair.

1. *Dr Drummond* demonstrated, under the microscope, specimens of Pacinian bodies which he had found in the tail of the cat, lying under the skin, along the mesial line, on the inferior surface. They presented the usual structure; they had not, so far as he knew, been previously noticed in this situation.

2. *Dr Gairdner* exhibited a pathological specimen of a large tumour, apparently aneurismal, situated near the kidney, which was atrophied, and its pelvis distended, from pressure of the tumour upon the ureter.

3. *Dr Sanderson* read a paper on the fats contained in the blood,

Drs Bennett and Gairdner entered into a discussion on this communication, more particularly in reference to the importance, the nature, and the changes of the fats found in the different parts of the body.

4. *Dr Gairdner* exhibited a microscope lately constructed by Nachet (of Paris), belonging to Mr Priestly. It differs from the ordinary small microscope of that maker, in having a large base supporting a pillar, with a joint at the top, which allows the inclination of the instrument from the vertical position. The mirror also is moveable, and can receive light from any direction. This instrument, with lenses and box, is sold for about 190 francs.

MEETING XIV.—*May* 28, 1853.—Dr GAIRDNER, Vice-President, in the Chair.

1. *Mr Barlow* exhibited minute injections of the dental pulp and dentine membrane, taken from a fœtal horse, about one month before birth. The specimens were preserved in a mixture of saturated arsenical solution and glycerine, by which the original transparency of the textures had been retained, and the injected vessels well displayed.

2. Dr Gairdner read a paper by Mr Sibbald,

ON THE INTESTINAL CANAL OF THE INFUSORIA.

"It appears a matter of surprise that such various opinions continue to be held about the nature of the intestinal canal of these simplest, and, in some physiological points of view, the most interesting of the animal series. The polygastric arrangement, described by Ehrenberg in monads and vegetable spores, is now almost completely disbelieved; but still in our standard works on comparative anatomy, his theories as a general rule are advanced as the most probable, if not certainly correct. The numerous cæca of the canal in the vorticellæ and other allied genera are still figured and described with all the precision of Ehrenberg's first description. Being convinced of the incorrectness of this theory, I have ventured to trouble the Society with the following observations:—

There is one question which must be decided *in limine*. Is there any definite course pursued by the ingesta in their progress through the body?

The object which I have found best adapted for examination with the view of settling this point is *ophrydium versatile*, one of the polypoid group of infusoria; and, of course, conclusions derived from the observation of this species can only furnish material for inference with regard to allied genera. By examination in the natural state, nothing can be made out but transparent vesicles embedded in the mass of green granules with which its substance abounds.

On feeding with coloured materials, such as carmine and indigo, these give place to globules of the colouring material. On watching the act of feeding, one may observe that the circlet of cilia surrounding the cephalic extremity, whirl the particles rapidly down the buccal cavity, and as rapidly most of them are whirled up again. Some, however, are retained at the bottom of this cavity ; and when a ball of sufficient size has been formed, it is squeezed through the inferior extremity further into the substance of the animal. It then travels down with a slight spiral course to near the tail, when it turns upwards, and eventually is expelled close to the mouth. In the *vorticella* and *bursaria*, nearly the same may be observed. However carefully they are watched, no cæca can be discovered, the vesicular appearance arising merely from the dilatation of the canal. That there is a definite course may be inferred from a bolus always following in the path which has been pursued by the preceding one. Further proof may be obtained in the following manner:—If some individuals of ophrydium be kept for about twelve hours in a tube containing water coloured with carmine in particles too small to be appreciable with a power of 60 diameters linear, and then examined, a coloured carmine red cylinder is observed lying spirally along the substance of the animal ; sometimes it is broken off, and then commences again further down the body ; and sometimes it terminates in a dilatation ; sometimes, also, a bolus and cylinder are seen in the same specimen. This I have not been able to observe in the *voricellæ*—for, as far as I have seen, they break up and dissolve immediately after death. They may be seen feeding, however, in the same way as the ophrydium, but the balls of food appear huddled together much more, after passing the inferior opening, and pass more slowly through the body ; but I believe, from observing the passage of the food, that it takes a spiral direction through the body ; the spiral here, however, is much more completely coiled than in ophrydium, and by the unequal and temporary dilations of the canal is occasioned the jumbled and disorderly appearance of the vesicles, which Ehrenberg has explained by the supposition of cæca.

The next point which presents itself for investigation is, whether there is any membrane lining this intestinal canal. Professor Goodsir, in his lectures, states his belief that there is no membranous lining, and my observations go decidedly to favour this view. In the first place, we cannot demonstrate any membrane ; indeed, as a general rule, the only evidence of the canal at all is the existence of the food within it.

If a vorticella be examined under the microscope, and a few drops of caustic potash be added to the liquid, the creature, on being touched by the potash, suddenly contracts itself, and very soon after the integument bursts, and the contents flow out ; the vesicles never remain connected, but are dispersed through the liquid in the same way as the granular matter of the body. If there was any membrane lining the canal, we should expect to find some connection maintained for a time, however short, after the bursting of the integument.

The buccal cavity, however, or that portion in which the bolus is formed before it is pushed into the intestinal canal, is undoubtedly lined with membrane, which in some, if not in all, is ciliated. When the ball of food is being formed by the aggregation of the particles whirled in by the circlet of cilia, it is rotated in the bottom of this cavity, by means of the cilia of the lining epithelium. By what means the ball is squeezed into the next portion of the canal I do not know ; I have not been able to detect any muscular fibres, so that till we are better informed, we must suppose that the membrane of the cavity, or the cells covering it, are endowed with contractile power. Arguing from analogy (and there are no facts to disprove it), it does not seem likely that the integument has any power of absorbing nourishment, but may very possibly serve as a respiratory and excreting organ.

I have laid before you some facts which I believe will bear the test of investigation, and some theory which, though perhaps less important, appears to be the simplest explanation of the facts, and most in accordance with the true physiology of these organisms."

Dr Cobbold and Dr Drummond were appointed to report on this communication.

3. *Dr Drummond* stated the results of some recent experiments by Professor Budge of Bonn, in regard to the sympathetic and spinal nerves. Dr D. demonstrated that division of roots of the brachial flexus in the frog was followed by contraction of the pupil of that side.

4. *Mr Barlow* showed, under the microscope, fine injections of the skin and matrix of the nail of the human finger,—of the Schneiderian membrane from the horse, in which the follicles were seen to be very abundant,—and of the mucous membrane of the eyelids, in which a row of large papillæ were noticed along the posterior edge of the free border of the eyelid, around the openings of the Meibomian follicles.

Meeting XV.—*June* 11, 1853.—Dr Bennett, President, in the Chair.

1. A report was read by *Drs Cobbold* and *Drummond* on Mr Sibbald's paper on the Intestinal Canal of Infusoria. Mr Sibbald was then balloted for, and duly elected a member of the Society.

2. *Dr Bennett* exhibited a demonstration, under the microscope, of an unusual mode of development seen in a fungoid plant on the surface of milk, which had been kept several days.

3. *Dr Gairdner* made a communication on malformation and disease of the aortic valves.

4. *Mr John Struthers* communicated a case of

MALFORMATION OF THE SEMILUNAR VALVES.

The patient was an emaciated man, æt. 33, broken down by dissipation. He came under Dr Niven's care only three days before death, and the symptoms were,—Dyspnœa, cough, hemoptysis, sputa tinged with blood. Pulse full, strong, and about 90. Considerable cardiac dulness. First sound obscured by a moderate bruit; second sound very indistinct.

Dissection.—Heart about a pound and a half in weight. Left ventricle much dilated and thickened. Right ventricle normal. Mitral, tricuspid, and pulmonary semilunar valves healthy. *Aortic Valves.*—There are two large valves and one much smaller. The large valves are lateral, right and left, separated posteriorly by the small one. Each measures 1 inch and $\frac{3}{4}$ from horn to horn, the left $\frac{1}{8}$ inch more. Depth of right 1 inch, of left $\frac{7}{8}$. Where they meet by their anterior horns, the left is attached half an inch below the right, the appearances indicating that this part of the valve had been lost. Also this end of the left valve has a large smooth hole in it, which nearly admits the point of the little finger, and through which the blood must have regurgitated freely into the ventricle. Posteriorly the large valves are attached a little above the horns of the small one, and in each there is a perforation, in the left the size of a crow quill, and in the right of a common quill. Through these the blood would regurgitate only into the cavity of the lesser valve. The small or supplementary valve measures five-eighths of an inch from horn to horn, and half an inch in depth. By its left horn it is attached a little below the top of the contiguous horn of the left valve, and by its right it joins the right valve one-fifth of an inch from the top of the posterior horn of the latter. Being attached a little lower than this end of the large valves. it would receive the blood which regurgitated through the perforations in them, and its cavity has a somewhat oblique inclination to the right side where the larger perforation looks down into it. It has a thickening like a corpus Arantii in its centre. The corpus Arantii of the right valve is situated so much behind the middle.

that, were this valve and the small one joined into one, it would be exactly in the centre. A thick band of fibres passed from this corpus Arantii on each side. The left valve is uniformly thick and opaque. The coronary arteries arise, one from above the middle of the left valve, the other above the right midway between its middle and the anterior horn. The aorta near the valves is very irregular, covered with soft tubercular elevations and a few calcareous deposits.

Remarks.—Mr Struthers remarked that, however frequent the cases in which two or more than three semilunar valves had been found, he was not satisfied that such a condition occurred as an original anatomical variety. Dr Peacock of London had collected some important facts on this subject. It was interesting to observe that the large proportion of cases of diminution of the number occurred at the aorta, whilst those cases in which the usual number was exceeded occurred chiefly at the pulmonary orifice. This corresponds to the view he thought was probable, that the formation of the two valves arose from disease in the adult, by which two valves were joined together, and then thrown down as one large one, whilst the formation of more than three valves was from disease in utero, being almost always at the pulmonary orifice, and in young subjects, and connected with the different physiological importance of that orifice before birth. It could not, however, be explained by the supposed greater activity of the right side of the heart before birth, as the fact was that, at least during the latter two-thirds of fœtal life, the walls of the left ventricle were already considerably thicker than those of the right.

Dr Peacock and Dr Gairdner were both agreed in considering the condition of two valves to be not original, but acquired; but whilst Dr Gairdner attributed the fusion of two of the original valves to disease in the adult, Dr Peacock seemed to look upon the condition as arising in the great majority of cases from malformation. In using the word malformation here Mr S. thought it necessary to distinguish between malformation owing to disease in utero, and original deviation or arrest of development. He was ready to believe in the existence of cases of two or four separate semilunar valves, as a healthy anatomical variety, as soon as he saw or heard of a case of either, in which all the valves were quite healthy, of equal size, and in all respects corresponding to each other. There appeared to be a principle implied in the number of three for these valves. In the trunks of the larger veins two was the usual number, three were rarely found in man; but in the larger animals it was stated that three occurred not unfrequently. When the vessel became large, and especially here where so much strength was required, it seemed that three valves became necessary, and a greater number than three would give complexity without additional openness to the passage and security against regurgitation. At the same time, that two valves might do was evident from the cases in which, although more or less diseased, they were found where death was due to other causes; and in these cases their diseased or irregular condition might be regarded either as affording evidence, on the one hand, that the condition had its origin in disease; or, on the other, if the two valves were of equal size, that they had been two in number originally, or very early during fœtal life, and that their consequent less perfect action had brought about the disease.

Cases such as the one he had recorded were most naturally explained on the view simply, that one of the valves had ceased to grow; but it was also possible that the small valve had been a portion of a large diseased valve united by adhesion to the wall of the artery, as in the case of the mode in which it is supposed the additional valve is formed when more than three are present; but in the similar case noticed by Dr Peacock, the small third valve had, still more than this one, the appearance of being an originally separate valve which in early life had ceased to grow.

Dr Gairdner had alluded to the fact of the different thickness of the semilunar valves, above and below the thickened band which crosses them, and that the upper portion was so thin naturally, as often to present small perforations. Mr Struthers explained what seemed to him to be the reasons of this decided difference in the thickness of the upper and lower part of these valves, which is much better marked in the aorta than the pulmonary artery. During their action the upper and lower parts were very differently situated. The lower part was bulged down towards the cavity of the ventricle, whilst the upper part was applied back to back with its two fellows, and projected up into the interior of the artery, and these two portions met at an abrupt angle, which corresponded to the line of division between the thicker and thinner portions of the valve. The upper part was thin, because there was much less strain upon it; and should a perforation occur here, the blood would not pass back to the heart, but across from the cavity of one valve to that of another; but the strain was chiefly borne by the lower part, which was therefore of greater strength, and any perforation here would necessarily allow a jet of blood to regurgitate into the ventricle. It seemed to be commonly supposed that the semilunar valves were just large enough to meet, and that the corpora Arantii were specially provided to fill up an imaginary or possible triangular chink in the centre. But the fact is, that each valve is long enough to reach much beyond the centre of the artery, and that, in the closed state, fully a third of the valve is doubled up into the interior of the artery back to back with its fellows, and there is not even an approach to the leaving of a triangular chink in the centre; and the corpora Arantii, whatever their precise use may be, are up in the interior of the artery a considerable distance above where the valves come in contact, as seen from below. The same remark applied to the action of the pairs of valves in the veins and lymphatic vessels. They were doubled and mutually supported against each other when in action; and the dilatations on these vessels, known to indicate the position of the valves, were to be looked upon in the same light as the sinuses of Valsalva, as special provisions for ensuring the action of the valves.

5. *Dr Matthews Duncan* read a communication

ON THE INTERNAL MEMBRANE OF THE UTERUS AFTER PARTURITION.

Dr Matthews Duncan stated, that he wished to lay before the Society what he believed to be the true anatomy of the interior of the uterus after parturition. Among obstetricians, at present there prevailed, on this subject, a great deal of confusion and error. It was to M. Cruveilhier that most of these errors were to be referred. He had stated his views with great exactness in his work on Pathological Anatomy, and he had been quoted and followed by numerous authors and teachers. M. Cruveilhier taught that the mucous membrane of the uterus was, at the time of parturition, subjected to an inflammatory process; that, in parturition, this membrane was discharged with the ovum; that the proper or muscular tissue of the uterus was laid bare—to use his own comparison—like the surface of an amputated stump; that this surface became covered by an inflammatory product, a false membrane; and that beneath this the new mucous membrane was regenerated, while the whole inner surface of the uterus was in a state of suppuration, yielding the lochia which he described as purulent.

This whole account always appeared to Dr Duncan to be an extraordinary tissue of physiological marvels; and if the phenomena described were not actually absurd, they were certainly without parallel in the physiology of any other organ, and as certainly unsupported by observation. He believed, on the other hand, that the uterus was never deprived of its mucous surface, although, under certain circumstances, its epithelial surface might undergo enfoliation in mass; further, that no active inflammatory process went on in parturition, or secretion of false membrane after it; and that the lochia was not essentially a purulent but a mucous fluid, containing chiefly epithelial scales along with the undistinguishable globules of mucus and pus. Dr Matthews Duncan showed the Society a section of the uterus of a female dying four days after delivery, which he had examined with Dr W. T. Gairdner. The whole inner surface of this uterus was covered by a moderately thick mucous membrane, distinguish-able from the muscular fibres beneath, and having its surface covered with epithelial debris. The site of the placenta was not made the subject of particular examination. He also exhibited a drawing of a section of a uterus through the placental site, taken from a woman dying fully four weeks after delivery. In this case the lining membrane of the uterus was of considerable thickness, greatest at the placental site, and thinning rapidly as it approached the cervix. On the surface of this membrane were observed numerous dark points, indicating the orifices of the follicles of this part. In the section of the mucous surface left over the placental site, sections of large vessels were distinctly seen, and in the same part some of them were noticed proceeding to the surface of the mucous structure at this part, which was bathed in sanious fluid. It thus appeared that the uterus was not denuded of mucous membrane even at the placental site, from the fact of the large vessels still remaining in it and abutting on its surface. If the mucous membrane were developed anew on these vessels, it could not, of course, have presented this appearance.

Dr Duncan had examined numerous other uteri at various times after parturition, and always observed an inner membrane covering its surface.

MEETING XVI.—*June* 25, 1853.—Dr BENNETT in the Chair.

WAXY DISEASE OF THE KIDNEY.

1. *Mr Kirk* made a communication in reference to the waxy disease of the kidney, accompanied by demonstrations. Mr K. showed that the waxy degeneration commenced in the minute bloodvessels, the capillaries of the Malpighian tuft, and the strait capillaries of the tubes.

Dr Gairdner corroborated Mr Kirk's observations.

Dr Bennett made remarks on the waxy lesion generally.

2. *Mr Hutchison* presented a communication, accompanied by demonstrations under the microscope,

ON TRUE AND FALSE CORPORA LUTEA.

I wish to offer a few remarks on what are, I believe, the distinctions between true and false corpora lutea.

It is now universally admitted, that each menstrual period is followed, or rather accompanied, by the rupture of one or more Graafian vesicles, and that the same phenomena accompany the periods of heat or rut in the lower animals. Such being the case, each return of the menses in woman, and of heat in the lower animals, must, according to Bischoff, be followed by the formation of one or more corpora lutea.

He maintained accordingly, that there was no difference between corpora lutea accompanying pregnancy and those accompanying an ordinary menstruation; or, in other words, that there was no difference between the so-called true and false corpora lutea.

Earlier writers, as Montgomery and Paterson, believed that there was an essential difference between false and true corpora lutea, and they were at great pains to lay down marks characterising both. More recently, Renaud, writing on the same subject, has laid down rules of distinction. He believes that false corpora lutea differ from true, in—

1. Size.
2. Colour.
3. In the relative thickness of their parietes.
4. In the rapidity with which they arrive at perfection.
5. In the smaller amount of time they occupy in disappearing.
6. In structural peculiarities.

The "structural peculiarities" he thus describes :—" When the yellow secretion of the spurious corpora lutea is placed under the microscope, it is seen to be made up of cells, enclosing one, two, three, or more nuclei, which are of a bright and clear colour, surrounded by granules or molecular particles. * * In shape the cells are irregularly rounded, oblong or oval."

I believe that these marks, which have been laid down by the authors quoted, such as difference in size, colour, and shape, the absence of a central cicatrix or cavity, are *not* essential characteristics of false corpora lutea ; inasmuch as I have met with false bodies possessing all these characters.

I believe that there is a difference between these bodies, but one unappreciable to the unassisted eye ; their microscopic characters are *essentially different.*

If we examine a true corpus luteum either in woman or the lower animals, by scraping off some of the piece, or making a very thin section, we shall find the field of the microscope covered with numerous large oval cells or bodies of a pale yellow colour, and countless oil globules, fatty granules and molecules. Some of the cells are nearly circular, others are oblong, while others are slightly caudate. All are possessed of granular contents, though, in some instances, I have met with cells which were oblong, and instead of being granular, possessing a single nucleus. On the addition of acetic acid, the cell walls instantly melt away, and their contents spread over the field.

Interspersed among the cells and granules, I have met with occasionally crystals of hæmatine and cholesterine. These cells I have found largest in the corpora lutea of the cow, next in woman, then in the sow, and smallest in the ewe. If, on the other hand, we examine a false corpus luteum, we shall find, in place of the large oval cells, small irregular bodies, some of which are irregularly quadrilateral, others trilateral, some are oblong and others round, but all are irregularly so. They are of a deep orange colour, and are always accompanied with numerous fatty granules and molecules.

Reagents have precisely the same effect on these cells as on the cells of true corpora lutea, strong acetic acid instantly dissolves the cell wall, and sulphuric ether as instantly the granular contents.

Dr Matthews Duncan said he could give no opinion as to the average differences of size of the corpuscles, pointed out by Mr Hutchison in different sets of corpora lutea. But he thought there were essential preliminary questions to settle before the results of Mr H.'s investigations could be accepted.

Dr D. thought much confusion would be avoided in this subject if the words *true* and *false,* as applied to different corpora lutea, were laid aside ; all corpora lutea were true. The distinction of importance among them was into virgin corpora lutea, or the corpora lutea of menstruation not followed by impregnation, and the corpora lutea of pregnancy. The former differed from the latter chiefly in the less amount of development of the soft yellow structure characteristic of these bodies. The corpora lutea of pregnancy were in very different circumstances from those of menstruation. After menstruation was over, the healthy congestion of the uterus, and especially of its lining membrane, gradually diminished, to be reproduced at next period. In like manner, the monthly congestion of the ovaries diminished, and the corpus luteum immediately commenced its process of atrophy, in most, though not in all cases ; the contained clot became absorbed, and the proper structure of the corpus luteum became contracted upon it. But if impregnation took place, this congestion of the uterus, and especially of its inner membrane, instead of fading, gradually increased and continued. In like manner, the monthly congestion of the ovaries was rendered permanent ; the ovaries remained somewhat enlarged during the whole of pregnancy. And probably as a result of this healthy congestion during pregnancy, the gradual absorption of the corpus luteum was in most, though not in all cases, prevented. This body continued about its original size till pregnancy was terminated, when it was removed in the great tide of absorption going on in the genital organs at this time. But although the corpus luteum remained nearly of its original size during pregnancy, yet the contained clot was removed, and its place filled up by the characteristic tissue of the corpus luteum. The differences of the corpora lutea of menstruation and of impregnation were differences merely in average degree of development; but it would certainly be a great step if Mr H. succeeded in pointing out what was yet a desideratum, an exact means of distinguishing them. In the cow, upon whose corpora lutea Mr H.'s experiments had been made, it was especially difficult to say what were corpora lutea of impregnation, and what of menstruation. The relative size and appearance of different bodies in the same cow's ovary were not sufficient to indicate what were true and what were false corpora lutea. Mr Barlow had informed Dr D., that in the cow these bodies were slow of disappearing, and as cows were generally reimpregnated within some few months after parturition, it was possible that the different sized corpora lutea in an ovary might be equally well corpora lutea of different pregnancies as corpora lutea of heat merely and of pregnancy also. In the cow, at parturition, the corpus luteum corresponding to that pregnancy was still very large; its absorption would probably be arrested at next period of heat, and in its diminished state it might be taken for a corpus luteum of heat at the end of next pregnancy. Till these various points were ascertained, and the history of the corpora lutea in the cow more fully made out, Mr H.'s researches could not be considered conclusive.

Drs Bennett and *Gairdner* also made remarks on the uncertainty of the distinction between true and false corpora lutea.

3. *Dr Cobbold* demonstrated striated muscular fibres in the umbrella of the jelly fish (medusa aurita).

Meeting XVII.—*July* 23, 1853.—Dr Gairdner, Vice-President, in the Chair.

1. *Dr Cobbold* demonstrated a preparation of aneurism of the arteria innominata.

2. *Dr Gairdner* showed some fine injections made by Mr Barlow, in which he had used "German glue" got from Newcastle. Mr B. recommended this kind as much superior to the common glue, and much cheaper than gelatine.